The Resilience of Pre-Merger Fields of Practice during Post-Merger Information Systems Development

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Forthcoming in the International Journal of Technology and Human Interaction, 14(3), 2018

ABSTRACT

This study analyzes the interactions among individuals engaged in information system development (ISD) projects aimed to support an organization created by the merger of previously independent entities. We draw on a practice perspective on knowledge sharing across boundaries to analyze two ISD projects in a post-merger integration (PMI) context of the merger of three hospitals. In both projects, the final IS-enabled practices differed from the post-merger practices that had been planned by the hospital management. Our analysis suggests that pre-merger fields of practice tend to be resilient, and that this resilience originates in some of the agents' actions aimed at maintaining the status quo. In addition, we found this resilience to be facilitated by the ease of tailoring the software packages used to develop the two IS.

Keywords: Post-merger integration, Information system development, Practice perspective, Knowledge sharing, Software package tailoring

INTRODUCTION

Mergers have long been recognized as a means by which firms seek to improve their market position and increase their return on capital (Vieru & Rivard, 2014). Post-merger integration (PMI) refers to the process of value-creation that organizations anticipate from a merger (Yoo et al., 2007). All mergers do not imply the same degree of integration among the parties, or the same degree of autonomy retained by each. There exist four ideal-type PMI approaches (Marks & Mirvis, 2001). At one extreme is *preservation*, which maintains the status quo in each merging organization. At the other extreme is *absorption* where one party requires the others to adopt its practices, norms, and culture. It may also happen that, along a *symbiosis* approach, the merging organizations are gradually combined by enforcing operational interdependence and a common culture, or that by *reinvention,* an organizational structure and work practices are implemented that are new to all parties.

Depending on the PMI approach, new corporate structures, rules and processes may need to be created and business functions may need to be reorganized (Empson, 2001). Among the structures and processes that require integration, information technology (IT) resources - infrastructures, applications, data and management practices (Tanriverdi & Uysal, 2011) - have been claimed to have important impacts on merger outcomes (Vieru & Rivard, 2014). To date, research on the integration of IT resources has illuminated its strategic nature, either identifying strategies for integrating the merging entities' IT resources (Tanriverdi & Uysal, 2011) or analyzing alignment of the post-merger IT function with business needs (Henningsson & Yetton, 2011). Little research, however, has been conducted on the development of new information systems that will be necessary to bridge the demarcations between previously independent organizations (Vieru & Rivard, 2015), thus integrating existing applications and data (Wijnhoven et al., 2006). In view of the paucity of empirical research on post-merger ISD and of the challenges that the PMI phase entails, the present study expands knowledge on post-merger IT integration by focusing on the dynamics of ISD in a PMI context. More specifically, we address the following question:

How do interactions among actors engaged in post-merger ISD projects influence the resulting IS and the corresponding IS-enabled practices?

To answer this question, we adopted a knowledge sharing perspective. Extant research has shown, although not in a merger context, that the success of ISD initiatives involving different professional communities highly depends on effective knowledge sharing (Orlikowski, 2002; Luna-Reyes et al., 2005). Problems of bringing together a diverse group of stakeholders are particularly acute in the post-merger integration phase because of the novelty of the context, the norms and values that drove practices in the merging entities, and the pace of evolution of technological platforms. In this context, the initiatives of sharing knowledge give unexpected results (Yoo et al., 2007) or are met with resistance (Empson, 2001). While there is clear preoccupation for analyzing cross-boundary collaboration in the ISD literature, there is a lack of empirical studies in the literature on post-merger IS integration to acknowledge this topic.

We espouse a practice perspective of knowledge, which conceptualizes knowledge as an integral part of daily work practices (Bourdieu, 1977). Under this perspective, individuals (or agents) share a common set of practices within a field of

practice (e.g., business unit or department) in pursuing a joint interest (Levina & Vaast, 2005). Because PMI involves agents from previously independent organizations, we posit that those organizations represent distinct fields of practice. We conducted two case studies within a large teaching healthcare center (THC) that resulted from the merger of three hospitals. The cases were ISD projects – from project inception until the systems were put in production – carried out over a period of six years. In each case, top management had the same objective: to go from three different sets of practices and information systems to a single set of practices and a single system. In both cases, however, the pre-merger fields of practice were resilient.

Our study makes several contributions. First, by adopting a practice perspective to knowledge sharing, it highlights the role played by boundary spanners in this context. Second, it identifies two social mechanisms that explain the causal path between knowledge sharing and the outcomes of the ISD. Finally, it reveals the role of the ease of tailoring the software package in strengthening the resilience of pre-merger fields of practice by enabling agents' efforts to preserve pre-merger practices.

THEORETICAL FOUNDATIONS

The Practice perspective on knowledge sharing

In general, practice perspectives focus on the criticality of individuals' actions for organizational goals and try to answer to 'how' practices are generated within a specific context, reinforced, reproduced, and altered, and with what intended and/or unintended outcomes (Vieru & Rivard, 2015). In our study, we focus on four concepts of the practice perspective: *practices, fields of practice, boundaries, and boundary spanners*. The term *practice* refers to the coordinated activities of individuals and groups in a specific organizational context (Brown & Duguid, 2001). A *field of practice* may correspond to business units, communities of practice or goal-driven groups in which agents who share unique sets of practices pursue a joint interest (Levina & Vaast, 2005). Within a given field of practice, agents are distinguished by their status, which is characterized by the accumulated amount of three types of individual capital: *economic* capital (e.g., personal finance), *cultural* capital (e.g., expertise) and *social* capital (based on professional relationships) (Bourdieu, 1977). Agents can transform either of their capitals into a fourth type, *symbolic capital,* which may give them the ability to claim relevant knowledge or *authoritative knowledge* (Vieru & Rivard, 2015). According to Suchman (2002), authoritative knowledge can be described as a knowledge that is "taken to be legitimate, consequential, worthy of discussion, and useful for justifying actions by people engaged in accomplishing some concerted task" (p.142).

For one to acquire symbolic capital, one must experience a *process of valuation* (Bourdieu, 1977). In cross-boundary collaboration, which is based on the possession of intellectual, social, and economic capital, an agent's claims of authoritative knowledge must be perceived as 'valid' by the audience, who then attribute legitimacy to the agent. In this vein, the positions agents occupy in a given field and the forms of capital they possess matter, but only to the extent that others in the situation value those positions and forms of capital, converting them into a source of symbolic power.

The differences in meanings and interests between fields are usually negotiated by *boundary spanners* (Brown & Duguid, 2001). They are specific agents situated at different intra- and inter-organizational levels that perform the roles of knowledge brokers (Levina & Vaast, 2005), which implies that they assess knowledge at the boundary and select the knowledge they consider pertinent. Boundary spanners may be nominated or may emerge, but to be effective they must be viewed as legitimate participants in the fields of practice being spanned and recognized as negotiators between fields, and they must be motivated to act as negotiators (Levina & Vaast, 2005).

Knowledge sharing in PMI settings

The literature on PMI suggests a connection between knowledge sharing and value creation and it implies that the latter results from the ability to share and integrate knowledge across the previous organizational demarcations (Bresman et al., 1999; Zollo and Singh, 2004; Hebert et al., 2005). Bresman et al. (1999) found that knowledge sharing is facilitated by rich communication during and after the completion of the integration process. Yet, it has also been also shown that when individuals perceive significant differences in the knowledge bases and organizational images of the merged companies, they experience fears of "exploitation" and "contamination," which trigger resistance to sharing knowledge (Empson, 2001). In another study, Yoo et al. (2007) found that organizational members have created their own knowledge sharing practices by appropriating the existing knowledge resources, fact that made upper management change the knowledge integration approach chosen. The study's main conclusion was that planned post-merger approaches to implement knowledge sharing often do not match the post-merger knowledge sharing needs.

Despite the fact that this line of work emphasizes the importance that knowledge sharing has in the PMI process, to our best knowledge, there is no empirical study in the literature on PMI to analyze knowledge sharing in the context of IS integration initiatives.

METHODOLOGY

We adopted an explanatory theory-building-from-cases approach (Eisenhardt, 1989). An explanatory approach seeks to find relationships between an "observed state of a phenomenon and conditions that influence its development" (Avgerou, 2013, p. 428). Following Eisenhardt's (1989) methodological recommendations, we anchored our problem definition and preliminary construct specification in extant literature and we crafted our data collection instruments and protocols on the basis of this literature, following a deductive pattern. This was followed, after our entry in the field, by a "flexible and opportunistic" (Eisenhardt 1989, p. 533) data collection approach, and a within-case and cross-case data analysis, which are inductive in nature. We used a multiple-case design and selected the cases applying a logic of replication, maximizing variation, thus predicting "contrasting results but for predictable reasons" (Yin, 2003, p.47), yet allowing comparison.

As shown in Table 1, the cases had two similarities: both took place in the same organization and were intended to support a new organization that would result from

adopting a reinvention approach to PMI. The cases varied in terms of the type of business process that was to be enabled – laboratory services and clinical information management – and the actual integration approach. The unit of analysis was the ISD project. The selected organization was the Teaching Health Centre (THC – not its real name), the result of a merger of three independent teaching hospitals: two Adult hospitals (the Downtown and the Midtown) and a Pediatric Hospital. The merger was initiated with the goal of creating a mega-hospital to provide 21st-century health care by implementing a "best practices" business model for coordinating care. According to the archive strategic documentation, the planned THC PMI approach was consistent with a *reinvention* approach (Marks & Mirvis, 2001).

Interviews were the main method of data collection and were based on a protocol (Appendix 1) crafted from extant theory and research. In line with our theory building approach, however, we remained open to the exploration of new topics and themes during data collection (Eisenhardt 1989). Informants were selected using a snowball sampling procedure. We interviewed key stakeholders, in particular project development and implementation committee members (i.e., department managers, IS professionals, project managers, and clinicians) who had participated in the ISD project. The interviewees were significant as agents, since they influenced the knowledge sharing process due to their roles, status, power and experience. Twenty-four interviews (Table 1) were conducted on site, and lasted between 45 to 90 minutes. For Case 1 we interviewed seven lab physicians, three lab technologists, three lab managers, the central lab manager, and the IS project manager. For Case 2 we interviewed three physicians, three nurses, one clinical analyst, one unit coordinator and one department manager. The interviews were recorded and transcribed. In a few instances, when clarifications were required, follow-up questions were asked via phone or email. We also conducted three follow-up interviews. One researcher was responsible for conducting all the interviews. The other researcher remained out of the field and played the role of devil's advocate (Eisenhardt 1989) during within-case and cross-case analysis.

Table 1. Selected cases

	Business Process	Planned PMI Approach	Final PMI Approach	Timeline	Number of Interviews
Case 1	Laboratory services	Reinvention	Mix of preservation and reinvention	2003-2006	15
Case 2	Clinical information management	Reinvention	Preservation	2004-2008	9

Although studies have shown that the participants in organizational processes do not forget key events in these processes, it is possible that a participant-informant in a retrospective study may not have judged an event as important when it occurred and therefore may not remember it later (Leonard-Barton, 1990). To avoid these shortcomings, we obtained access to a number of emails that team members exchanged during the IS development. We also followed Leonard-Barton's (1990) recommendation to engage in informal conversations (e.g., at lunch or in hallways) with

individuals who were members of the project teams because useful data may emerge from this type of interaction.

Following our theory building approach (Eisenhardt 1989), we triangulated the interview with archival sources, including project documentation, organization documents (PMI management strategy documentation, management presentations, and schemes of governance structure, communication plans, and emails). The archival documents were used in four ways. First, reports and presentations were used to assist putting together the projects chronology, including identifying the dates of important events and decision junctures. Second, emails and management presentations were used to formulate and refine interview questions. Third, reports and meeting minutes were used to corroborate and validate interview reports. Finally, meeting minutes provided an "ethnographic" sense of the project work.

The coding process started by creating a provisional "start list" of categories (Table 2) based on extant literature. All of the transcripts were coded using the preliminary set of codes. In line with our theory-building objective, we remained open to emerging themes (Miles et al., 2013). The process yielded two new coding categories:

1. *Ease of tailoring*, referring to the extent with which idiosyncratic practices could be accommodated within the system under development, be it by software configuration, screen masks, extended reporting, workflow programming, or interface development (Brehm et al., 2001).
2. *Illusion of reinvention*, referring in both cases to the resulting practices embedded in the system design, which deceptively gave the impression of a new set of industry-based practices.

Table 2. Coding Categories

Initial Coding List Categories	Differences in practices
	Fields of practice
	Boundaries
	Cross-boundary collaboration practices
	IS design
	Symbolic capital
Emerging Category	*Ease of tailoring*
	Illusion of reinvention

We conducted within-case and cross-case analyses. During the within-case analysis, themes emerged from the data and provided a rich understanding of each case. The outcomes of this analysis constituted the logical chains of evidence. Cross-case analysis was conducted by using methods suggested by Eisenhardt (1989), as the cases were compared to identify similarities and differences between them.

FINDINGS

Case 1: The Laboratory information system (LIS)

In 2002, upper management acquired a software package to provide common best practices for its unified Laboratory departments. The software, Sigma, was based on industry standards and provided flexibility to accommodate, to a certain degree,

idiosyncratic practices. The initial design of the LIS embedded a set of practices based on Sigma's approach to best practices and on THC upper management requirements. It was expected that these practices would follow a *reinvention* PMI approach.

In a hospital an LIS enables accurate tracking, processing and result recording, while avoiding lost and misplaced specimens. THC's three laboratory services were using three different workflows supported by different legacy ISs. During Phase I, the three lab services were asked to standardize their practices (lab request workflow). Even though the typical lab workflow (scanning barcodes that include laboratory number, patient identification and test destination – hospital department/physician) seems to be forthright, each of lab service was using different sequence steps and different systems. During this phase, the lab clinicians struggled to find common ground in the specimen management processes and tried to accommodate as many old procedures and workflows as the new system would accept. At the end of December 2004, Sigma advised THC that it would provide a new version of the LIS.

Early in 2005, Phase II commenced with the LIS team members re-starting the process of programming the system's database from scratch. During Phase II, the nature of the group dynamics changed, as upper management brought several well-known laboratory physicians into the project, hoping they could bring about the much-needed collaboration between team members. Therefore, the weekly team meetings produced a mix of compromises and executive decisions that influenced the final system functionality. After almost three years of software tailoring, testing and implementation, the new LIS was deployed at Downtown in 2005, followed by Midtown and Pediatric at the beginning of 2006. While the initial design was based on best practice standards, the final tailored design revealed a blend of industry standards and local pre-merger idiosyncrasies.

Case 1: Within-case analysis

Fields of practice and boundaries

As illustrated in Table 3, the three site-based lab services were using three different workflows, each with a different set of practices:

> *"We had Downtown working one way, Midtown working another way, Pediatric working a different way." (Downtown laboratory technologist)*

At the beginning of Phase I, the context of the project featured a high level of novelty that prevented the project team members (the agents) from correctly assessing differences in knowledge of each other's practices and the dependencies between the team members.

> *"When it came to building the system, this was something new for everyone. This was having three feeder systems go into one feeder system. This was the first time..." (Downtown laboratory technologist); "I felt sorry for them [LIS team members] because they were thrown in cold. This was very novel for most of them." (Midtown laboratory director);*

Under these conditions, sharing knowledge was not possible until team members understood the differences between the practices of the three laboratories (end of Phase I).

"It was seeing how the other person thinks. You come with an understanding of how institutions work – and not all institutions work the same – and ours is different for a lot of reasons. Just as blood taking has evolved totally differently at the Downtown site." (Downtown laboratory physician)

Table 3. Case 1 analysis

Dimension of Analysis	Phase I	Phase II
Fields of practice and boundary evolution	At the outset – Three: Downtown, Midtown and Paediatric; pragmatic boundaries between the three fields of practice	Outcome – Three: resilient fields of practice; preserved boundary between the Paediatric and Adult sites; traces of boundary between the two Adult sites
Boundary spanners	Three boundary spanners are nominated but only the Downtown laboratory technician successfully became "in-practice" - mitigating knowledge differences and enticing agents to share knowledge	Another nominated boundary spanner (Midtown microbiologist) became "in-practice" and negotiated trade-offs
Symbolic capital		Boundary spanners-in-practice (Downtown laboratory technician and Midtown microbiologist) claimed authoritative knowledge to legitimize system's configuration
IS design	Initial – Inceptive design proposed by Sigma was based mostly on industry best practices (80%) without taking into consideration local idiosyncrasies	Final – mix of industry-based new practices and some pre-merger idiosyncratic practices
PMI evolution	Intent: *Reinvention*	Final: Mix of *reinvention* and *preservation* approaches

Not only had some of the agents never met before, but the coordination of the various groups was challenging because of different site-based interests, practices, structures, and norms. In addition, the representatives of each site were trying to demonstrate that their practices were better suited to be incorporated into the new system functionality.

Boundary spanners and symbolic capital

While during Phase I the agents reluctantly engaged in knowledge sharing, during Phase II, the sense of urgency to standardize practices, along with pressure from upper management, made the agents negotiate trade-offs. At the outset of Phase I, upper management decided that collaboration and knowledge sharing across the boundaries between the sites would be initiated and fostered by three *nominated boundary spanners* (Downtown laboratory technologist, Midtown microbiology manager, and Downtown pathology manager). The role of these agents was to, first try to establish trusted links across the boundaries between the fields of practice and then, to entice knowledge holders into sharing their knowledge. While the Downtown laboratory technologist was successful, the other two boundary spanners struggled to persuade laboratory clinicians to share knowledge. The difference was that while the Downtown laboratory technologist had great technical expertise (intellectual capital) and knew the

other site-based laboratory staff (social capital), the other two had never met most of the laboratory clinicians. The Downtown laboratory technologist was considered by the others to be a legitimate participant in the practices of the three fields. He easily evolved from being a *nominated boundary spanner* to a *boundary spanner-in-practice*.

> *"I knew the players and what they wanted. So to me, it wasn't as challenging as it was for other people." (Downtown laboratory technologist); "I told people, 'Do you know at the Midtown site they do it this way, at the Downtown site, [that way],' and I got told by one doctor, who said that I had no business telling them this. They had a big problem trusting the technologists from the other site." (Midtown laboratory manager)*

During Phase II, two laboratory physicians (the Midtown microbiologist and the Downtown pathologist) were nominated by upper management as boundary spanners in order to push the project ahead by brokering knowledge sharing and convincing the other agents of the need to implement new practices. The two physicians were well-known and respected hospital members (intellectual capital and social capital), and they easily evolved into *boundary spanners-in-practice.* Becoming a *boundary spanner-in-practice* requires an agent to "have the ability to negotiate the relationship between the involved practices" by developing an "understanding of each practice" (Levina & Vaast, 2005, p.353).

According to Levina and Vaast (2005), while the *nominated* type involves agents who are appointed as boundary spanners by management, the *in-practice* type represents agents, nominated or not, who are actively involved in knowledge brokering across the boundaries. A boundary spanner-in-practice is either an agent who evolved from a nominated boundary spanner or an agent who willingly and effectively engages in knowledge brokering across the boundaries. The two boundary spanners negotiated trade-offs or made executive decisions as required. One of them mentioned:

> *"Frequently, I would be the mediator, the person to try to calm things down. But you have to pick your battles. We have had to accept that the Pediatric site will do something and the Adult sites will do something different, to just keep it quiet." (Midtown microbiologist);*

During Phase II, two of the boundary spanners-in-practice (the Downtown laboratory technologist and the Midtown microbiologist) took initiatives to influence the ISD process and acted as knowledge brokers. They took advantage of their accumulated symbolic capital to claim authoritative knowledge to legitimize the new system's design.

> *"It's probably because I know the players: the physicians, the directors. If someone wanted to push something through, if they didn't get my blessing it wasn't going to happen." (Downtown laboratory technologist); He [Midtown microbiologist] was very knowledgeable about what systems can do for us. He was very instrumental in getting us to go along that route. People were not always pleased but he has had to force standardization because in microbiology we have probably 250 lab protocols." (Microbiology technologist)*

Evolution of boundaries

The initial design proposed by Sigma Phase I of the project was supposed to reflect a unified set of practices based on THC upper management requirements. While the new

LIS created a bridge across the labs, it did not completely remove the boundaries between the fields of practice.

> *"There is only one [system], with many exceptions. The point is that when you want to make common protocols, it's not only at the laboratory level, it's also at the physician level, and the pediatricians are different… So we had to do much more to please them." (Midtown microbiologist)*

While the boundaries between the Adult sites were significantly diminished (although not eliminated), the boundaries between the Pediatric site and the other THC sites were unchanged.

Ease of tailoring the software

At the signing of the contract, Sigma claimed that its software package was 80% designed based on U.S. industry standards and that THC would only have to configure the remaining 20% to accommodate local practices. However, two and a half years and two major revisions later, the LIS had a significantly different functionality from what had been proposed in the initial design. According to Sigma, its software package allowed some tailoring, but not much of the local contingencies. Thus, one year after the system implementation, the laboratory technologists created workarounds to accommodate a number of pre-merger practices. According to the Downtown laboratory manager, part of the laboratory staff was using the LIS in unintended ways:

> *"We thought that there was only one way of working with the system. But a year after implementation [2007], we did a follow up and we found that some people were having problems with the functionality and that they [the laboratory staff] resolved it. We found out that there were different practices… workarounds, depending on the problem." (Downtown laboratory manager)*

Resulting IS-enabled practices

The ease of tailoring the Sigma software package enabled the new LIS to both impose new practices (lab requests and access to results) and preserve some pre-merger practices (order entry). Thus, it unified all three laboratory protocols across the sites in one common system. However, at the same time, the ease of tailoring made it possible for the Pediatric site to keep its pre-merger order entry procedures and for a number of laboratory technologists from the Adult sites to use workarounds to accommodate some pre-merger practices. This suggests that the resulting practices reflected a mix of *reinvention* and *preservation* (at the Adult sites) and *preservation* (at the Pediatric site), compared to a *reinvention* approach as originally planned.

Case 2: The clinical results display (CRD)

In the summer of 2004, the THC decided to implement a Clinical Information System (CIS) by signing a contract of collaboration with Delta, a supplier of CIS solutions. A CIS is a software package that is the most complex IS in terms of patient data management and it offers one-stop access to patient information by centralizing all electronically available clinical data. The CIS was considered as the cross-departmental IT-lead *reinvention* post-merger integration approach. Seen by the upper management as the "project that will change our lives", the THC and Delta decided to adopt a cautionary, multi-phased, approach to implementing the CIS.

According to CIS project documentation, this approach was structured to achieve the following three main goals: a) Show results incrementally throughout the course of the project; b) Achieve buy-in and transfer ownership of the solution developed to the clinical community; c) Introduce industry best practices for how patient information is viewed and/or captured gradually as opposed to all at once. To achieve these goals, Delta and the THC decided that the project would be conducted in 3 phases. Delta CIS offered in Phase 1 a Clinical Results Display (CRD) that provided a unique "smart summarization" in a series of screens that display patient demographics and clinical results. Our study focused on this phase of the project because the other phases were still in progress at the time of the interviews.

Phase I was completed in December 2008. In the initial design, the CRD was supposed to bring information, scattered across the THC sites, to one central access point in front of any THC caregiver. Although requirement assessment and the development of the interfaces between the ancillary systems and the CRD seemed to be a straightforward process, soon the team members realized that, due to the differences in procedures between the three sites, the task was daunting. Due to the political sensitivity of the system, upper management had involved some of the most influential THC clinicians in project coordination to ensure that the functionality of the new CIS would reflect the desired integration approach. Some of these clinicians were already well known to the THC community, while the others soon impressed the other team members. At the outset of the project it was anticipated that a first draft of the design of the CRD would be ready by the end of 2004 and a production version would start being implemented in three pilot departments each at each of the three main sites by mid-2005. However, budgetary constraints triggered important delays and the pilot test was ready in May 2006. In September 2006, the conclusions on the pilot test were presented to upper management. A list of issues and suggestions for solving them were offered. The team members had to strike a compromise between the needs of the respective departments and the ease of tailoring the CIS package.

The CRD did not lead to real changes to patient information management practices. However, on one hand, the fact that now nurses had to access patient information through a single system instead of several ancillary systems constituted a major change in their workflow. This change made their workflow more efficient but did not alter how they handled patient information. On the other hand, for the physicians, the CRD provided a single point of access to enhanced patient information, a sort of "best of all worlds." Now the physicians had access to comprehensive clinical information from all sites, regardless of their physical workplace.

Case 2: Within-case analysis

Fields of practice and boundaries

Table 4 synthesizes the case analysis. Before the merger, three different patient information management practices were present at THC.

> *"At the Adult sites, each clinical group have drastically different workflows, so you couldn't follow patients across both sites. Well, the Pediatric site is very special, they always will be. They're focused on children and we can't understand them, they're a separate world." (Midtown physician)*

Boundary spanners and symbolic capital

At the outset, upper management decided that several clinicians who were influential in their respective fields of practice (the Downtown physician, the Downtown nurse, the Pediatric physician, and the Midtown clinical analyst) would mediate the cross-boundary knowledge sharing process. They were the *nominated boundary spanners* and had no difficulty evolving into *boundary spanners-in-practice* and engaging in negotiations due to their significant symbolic capital.

> *"They are the pillars, when we talk about the Downtown physician, the Midtown physician, and the Paediatric physician; they are people who were able to connect the system to the clinical needs and they made sure that if there were options, then they would say, 'This is the one that we think is the best." (Midtown clinical analyst)*

Table 4. Case 2 analysis

Dimension of Analysis	Phase I
Fields of practice and evolution of boundaries	At the outset - *Three*: Downtown, Midtown and Paediatric; significant boundaries between the three fields of practice Outcome – *Three*: Downtown, Midtown and Paediatric; resilient fields of practice due to preservation of practices
Boundary spanners	Nominated boundary spanners evolved into boundary spanners-in-practice (due to their symbolic capital) engaged in knowledge brokering and trade-off activities at the boundary
Symbolic capital	A number of group members were highly regarded, treated by the rest of the project stakeholders as "the pillars" of the project. One of them (the Downtown physician) claimed authoritative knowledge to legitimize the system's configuration
IS design	Initial – Inceptive design proposed by Delta represented a backbone based on industry best practice standards Final – Reflected the pre-merger practices, now just more efficient
PMI evolution	Intent: *Reinvention* approach; Final: *Preservation* approach

One of the *nominated boundary spanners* (Downtown physician) took advantage of his accumulated symbolic capital to claim authoritative knowledge, thereby legitimizing the process of tailoring the CRD screens.

> *"As a director and being aware of the differences between the Downtown and Midtown sites, I had to bring that to the table. So I proposed early on to start developing almost all the details we used in the window to create the patient summary screen. And everyone thought it was a good idea." (Downtown physician)*

Evolution of boundaries

The initial design of the CRD was to reflect upper management's objective of implementing a system that would enable new practices: a centralized repository with one point of entry for accessing and managing patient data, hence tearing down existing boundaries between the fields of practice. The resulting system reflected a unified approach to managing patient information across the THC sites. However, the only change in practice for the nurses was that now they were accessing patient information through a central point, whereas before they needed multiple logins on several systems

to access the same information. Their workflow was not changed by the CRD; it was just streamlined. For the physicians, the new system reflected a single point of access to a blend of site-based workflows, a better way to organize the management of the patient information across all sites, yet retaining the same pre-merger practices, which were now just more efficient. Thus, our analysis found a *preservation* approach (streamlined pre-merger workflows for both nurses and physicians in the resulting PMI approach) rather than a *reinvention* approach, as planned. The boundaries were not eliminated and the resilience of the three fields of practice was reflected in the preservation of pre-merger practices.

Ease of tailoring the software

Despite the CIS' expected high level of flexibility *("We'd buy one system that would fit everyone"* – Downtown nurse), its implementation was complex, mainly because of the difficulties in re-thinking local contingencies when looking for an adequate fit between technology and the organizational context. However, Delta's software was highly flexible, allowing the agents to accommodate most of the departments' requests in terms of functionality by developing interfaces with the rest of the hospital systems and creating screen masks (integrating several screens into one).

> *"The system was chosen to be highly configurable. The final configuration was quite different from the initial one." (Downtown physician)*

Resulting IS-enabled practices

The ease of tailoring the CIS software package not only allowed THC to have a single point of access to enhanced patient information, but also gave physicians the feeling that they had a personalized IS and preserved their practices.

> *"You can configure it as you prefer. For example, there was an endocrinologist who was like 'I want to see my results always this way'. Well, that's easy, we can build it or we can configure it." (Midtown physician)*

CROSS-CASE ANALYSIS AND THEORETICAL DISCUSSION

Despite the efforts of the boundary spanners to achieve a solution that would satisfy the agents and the THC management, in both cases most of the pre-merger practices were preserved in each hospital and were supported by an IS suited to the requirements of each. In view of extant research on PMI and on ISD, this outcome is not entirely unanticipated. Indeed, the PMI literature has portrayed resistance as a major impediment to successful mergers (e.g., Empson, 2001). Likewise, user resistance during ISD projects has been well studied, and models that explain why user resistance occurs, as well as the extent and consequences of resistance behaviours have been proposed (e.g., Lapointe & Rivard, 2005). If we were to analyse our case data using the perspectives offered by the works cited above, we would most likely find support for their findings.

While such analyses would have provided a rich understanding of the situation under study, our intention was to go beyond the explanation of why agents resisted the implementation of unified practices and of a unified system or to observe that tailoring

contributes to less resistance. Indeed, our objective was to offer a substantive explanation (Gregor, 2006) – that is, developed for ISD during PMI as a specific area of enquiry – of *how* the actors involved in the ISD projects interacted and *how* the nature of these interactions affected the outcomes of the two ISD projects. In this vein, our theorization approach has an explanatory nature by identifying social mechanisms that would explain the intermediate events that partially influence the evolution from an initial state of a phenomenon to a final observed outcome (Gross, 2009). Social mechanisms are defined as processes composed of actions, events (Avgerou, 2013), and "chains or aggregations of actors confronting problem situations and mobilizing more or less habitual responses" (Gross, 2009, p.368).

Our study identifies social mechanisms that influence the practices of knowledge sharing during collaboration initiatives of IS development in a PMI context. A number of IS studies use social mechanisms to explain process outcomes but do not explicitly identify them. For instance, *knowing-in-practice* (Orlikowski, 2002) and *resistance to IT implementation* (Lapointe & Rivard, 2005) are social mechanisms used in explaining outcomes of IS without acknowledging them as such.

Fields of practice resilience: an interplay between boundary spanners' utilization of symbolic capital and the utilization of tailoring the two software packages by the agents

Our study suggests two social mechanisms for practice preservation: (1) the boundary spanners' use of symbolic capital during the system implementation processes and negotiations of tradeoffs, and (2) the utilization of tailoring the two software packages by the agents to create the *illusion* of integration, which can be described as a pseudo-transformation of their practices resulting in a mix of new and mostly pre-merger practices. While these social mechanisms are not specific to an organizational context, the events that triggered them in our two cases are specific to a post-merger integration environment. The cross-case comparison reveals key similarities among and differences between the three settings, as summarized in Table 5.

Concerning the boundary spanners, only by becoming *boundary spanners-in-practice* did the nominated boundary spanners successfully negotiate trade-offs among the agents in both cases. Furthermore, some of these *boundary spanners-in-practice* used their symbolic capital to make successful claims of relevant knowledge. Downtown laboratory technician and Midtown microbiologist (Case 1), and Downtown physician (Case 2) were able to entice team members to engage in the negotiation of trade-offs because they knew that their symbolic capital was valued and uncontested by the other agents. Notwithstanding their efforts, they were unable to convince the other agents that a total replacement of the pre-merger practices was the best path. They realized that *reinvention* was not realistic, and that trying to negotiate trade-offs would be a pragmatic alternative in a context of resilient knowledge boundaries.

The pre-merger fields of practice were resilient, in that the members of each field of practice preserved or adapted their norms, values and practices. Group or community resilience has been suggested to represent the ability "to cope with external stresses and disturbances as a result of social, political, and environmental change" (Adger, 2000, p.347).

Table 5. Cross-case analysis summary

Themes		Case 1 (LIS)	Case 2 (CRD)	Findings
Role of agents and evolution of boundaries	Fields of practice and boundaries	Outset: three Outcome: three; resilient boundaries	Outset: three Outcome: three; resilient boundaries	Resilient boundaries in both cases due to: • Agents' attempt to "retain" as many as possible pre-merger lab procedures despite boundary spanners' efforts; Ease of tailoring, trade-offs and workarounds affected the final system design (Case 1) • Ease of tailoring allowed the preservation of most of the agents' pre-merger practices (Case 2)
	Boundary spanners' symbolic capital	*Nominated boundary spanners*: try to mitigate differences and establish shared meanings Once evolved into '*spanners-in-practice,*' the boundary spanners use their symbolic capital to claim authoritative knowledge	*Nominated boundary spanners*: try to mitigate differences and establish shared meanings	
	PMI approach	*Intent*: Reinvention *Final*: Mix of preservation and reinvention	*Intent*: Reinvention *Final*: Preservation	
Level of ease of tailoring the software package and resulting IS-enabled practices	Ease of tailoring	Medium level – preserves Pediatric practices and accommodates some local Adult site practices. Users engage in workarounds.	High level – capable of accommodating most requests	In both cases, the level of the ease of tailoring the software is the main factor during the process of negotiating trade-offs.
	Resulting IS-enabled practices	*Final*: One common system; functionality reflects a mix of pre-merger practices (Paediatric and Adult sites) and new practices (Adult sites)	*Final*: One common system; functionality reflects a mix of pre-merger practices and new practices (streamlined workflow)	

The agents coped with the change by trying to preserve their practices. In the case of the Pediatric site field of practice, they succeeded. They were less successful in the case of the other two fields of practice, where they handled the stress of change by modifying their practices as little as possible. In both cases, the final ISs design with their embedded practices differed from their initial system design under a *reinvention* approach. In each of the two cases, the final IS functionality reflected a trade-off between the initial design for new practices and the site-based pre-merger practices.

Although they replaced the multiple site-based legacy systems, in the end the two cross-boundary ISs offered upper management just an illusion of *reinvention*.

In their practices of spanning knowledge boundaries, the boundary spanners took advantage of the ease of tailoring the software package to enable the implementation of the new practices sought by upper management, but also to negotiate trade-offs with the rest of the team members in order to accommodate some idiosyncratic Adult site-based practices and preserve practices at the Pediatric site. The two ISs that were implemented at THC were software packages, as the THC management sought to minimize the costs and the delays associated with the custom software development. Industry-based or organization class-based practices are usually embedded in software packages (Brehm et al., 2001). Therefore, organizations acquiring these packages need to ensure that industry-based practices would fit their local needs without extended software modifications that are usually implemented in traditionally designed custom packages. However, due to different levels of flexibility and integration of the software and the extent of the tailoring that is needed by a specific organization, the amount of effort required to make the appropriate system design is a key success factor of the system implementation (Brehm et al., 2001).

At THC the agents took advantage of the ease of tailoring the software because they perceived it as enabling them to preserve their practices. Thus, we assume that in a PMI context, the less effort is required to tailor a software package, the more agents will be able to preserve pre-merger practices should also be investigated further.

CONCLUSIONS

Our study addressed the questions of whether the interactions among individuals engaged in ISD projects during PMI influence: (1) the resulting IS-enabled practices, and (2) the PMI process and its outcome. We found that agents' perceptions of others' practices were influenced by the actions of the boundary spanners-in-practice. This resulted in new ISs enabling pre-merger practices and an illusion of integration as the outcome of the PMI process. The main contribution of our study is to explain how outcomes different from those expected from a planned PMI approach do occur. While each of the two ISs presented in our study were expected to embody a *reinvention* approach, by the end of the ISD processes Case 1 reflected a mix of *preservation* and *reinvention* PMI approaches and Case 2 presented a *preservation* PMI approach. Indeed, our cases show that, at times, such practice-based knowledge boundaries may be difficult to cross.

Our analysis suggests a two-fold explanation for the resulting IS-enabled practices: first, the agents had a hard time to understand practices on the other side of the boundaries. This encouraged some of the boundary spanners-in-practice to use their accumulated symbolic capital to portray their discourses as legitimate, leading to successful negotiations of trade-offs. Second, the results show that the level of ease of tailoring the two packages shaped the final IS functionality by restraining (in Case 1) or enabling (in Case 2) agents' efforts to preserve the pre-merger practices. Therefore, the combined effects of the two social mechanisms used by the boundary spanners, - use of symbolic capital and taking advantage of the ease of tailoring the software packages - influenced the nature of the resulted practices embedded in the two new systems.

The theoretical causal explanation by identifying social mechanisms provides two main contributions to IS research. First, in our study the two social mechanisms made explicit the causal path between practices of knowledge sharing and the outcomes of the systems development. Second, by identifying these social mechanisms while drawing on Bourdieu's practice theory, we were able to produce more complete causal explanations of the outcomes of knowledge sharing during IS development efforts in a PMI context. However, we need to take into consideration that in the end social mechanisms-based process theorization needs to be considered as an incomplete form of causal explanation (Avgerou, 2013).

This research also addresses the needs of practitioners. First it suggests that before deciding to implement industry-based new practices embedded in software packages, managers should consider engaging in a process of assessing what the ideal blend of local and industry-based practices would be appropriate to their organizational context. A second implication pertains to a critical area for ISD project managers: the adoption of the newly developed IS. It has been suggested that powerful system sponsors or a strong group of active users may inhibit wider adoption of a new system, since potential users perceive the new system as "for nominated boundary spanners to decide how to use" rather than "for everybody to use" (Levina & Vaast, 2005, p.357). However, in our study we found that in a PMI context characterized by different knowledge bases and organizational values and conflicting interests, only strong-minded boundary spanners-in-practice with symbolic capital were able to push for the development of ISs for everyone to use across the boundaries.

The main limitation of this study is that it provides generalizability of the conclusions from empirical statements to theoretical statements in developing a process theory from case studies (Lee and Baskerville, 2003). THC was a unique setting in many respects and, to offer statistical generalizability, it would be productive that future research continues building the theory developed in this study based on data from other PMI settings in different industries. The theoretical explanation offered here opens up avenues for more in-depth explorations of some of the more complex processes associated with the dynamic relationship between the social aspects (agents) and the material aspects (IT) of organizational change.

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Appendix 1. Interview Protocol

Concepts	Questions
Individual status	What was your role in the previously independent hospital? What was your role in the project?
Fields of practice at the outset	At the beginning of the project, were there any differences in work practices and norms between the sites/departments? How would you assess these practices – some differences, very different, or can't compare? How many practices would you clearly identify? Describe Can you describe the position within the department/hospital of the major players involved in the LIS/CRD implementation process? Do you feel that these differences had played a role in the process of collaboration (information/knowledge transfer/share) during the IS project? Please describe a concrete example.
Boundaries between fields	Were there any challenges/difficulties at the outset of the project due to differences in work practices of the other sites?
Initial IS design functionality	What were the objectives of the project? Can you describe the initial (planned) design of the new IS?
Project salient events	Tell me about the history (timeline, events) and the nature of the IS implementation project? Milestones. Other important events.
Final IS Functionality	In your opinion, how different was the functionality of the final version of the system from the initial (planned) design?
Fields of practice at the outcome	Once the system was implemented, did the work practices of the users of the new system change? If yes, how different were they at the end of the implementation from how they were at the outset of the implementation of the IS?
Individual capital and valuation process	Did you find that there were other team members that you find them influential during the system implementation due to their expertise, knowledge, or status within the organization? Which ones? What was the main benefit of having these individuals as members of the project team for the system outcome? Was their input valuable? If so, why?
Role and actions (discourses) of the boundary spanners	Would you call yourself a boundary spanner? (*Interviewer will provide a layman definition*) If yes, what were your actions as boundary spanner? Decisions regarding changes to the original functionality of the system were taken during the implementation process – do you think that these decisions were influenced by some of the team members? Did any of the team members try to influence the way the system was designed? If yes, do you think that this was due to their prior experience in the domain, their knowledge, or the fact that they were reflecting the needs/interests of the department/pre-merger hospital that they were representing? Can you think of an incident when you and the rest of the project stakeholders did not agree about the functionality of the system? How often did this happen? Did you try to convince the others of your decision? How? If not, why not?